From raw data to single subject source analysis

From single subject source analysis to group statistics

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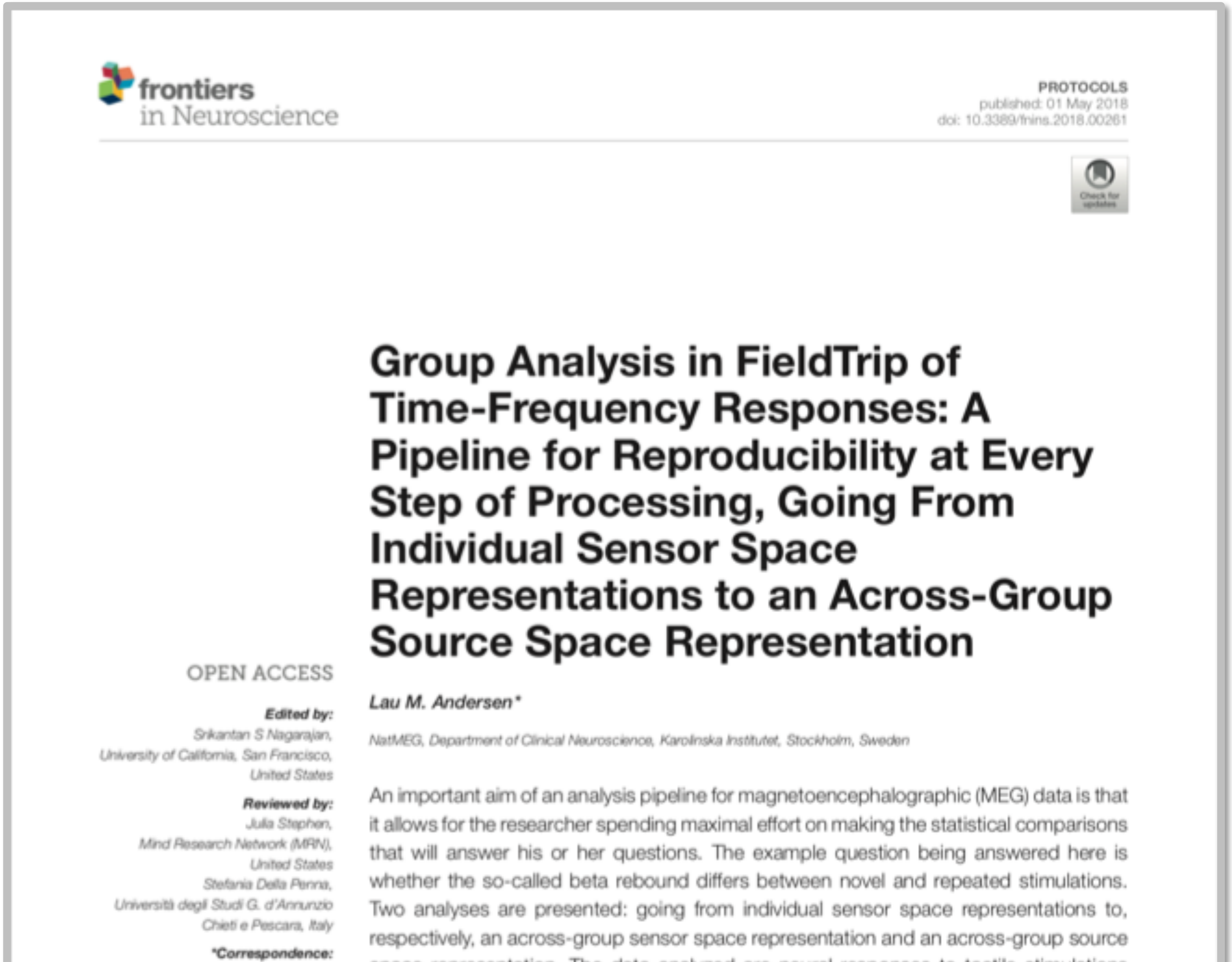
Workshops @ MEG NORD 2018

https://doi.org/10.3389/fnins.2018.00261



frontiers
in Neuroscience

PROTOCOLS
published: 01 May 2018
doi: 10.3389/fnins.2018.00261

Group Analysis in FieldTrip of Time-Frequency Responses: A Pipeline for Reproducibility at Every Step of Processing, Going From Individual Sensor Space Representations to an Across-Group Source Space Representation

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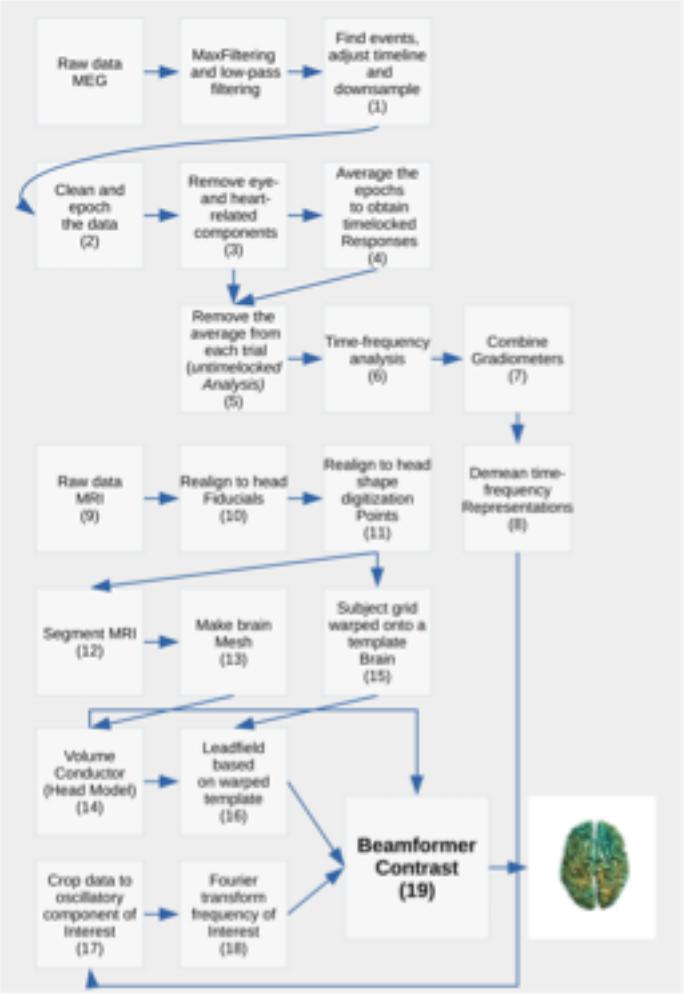
An important aim of an analysis pipeline for magnetoencephalographic (MEG) data is that it allows for the researcher spending maximal effort on making the statistical comparisons that will answer his or her questions. The example question being answered here is whether the so-called beta rebound differs between novel and repeated stimulations. Two analyses are presented: going from individual sensor space representations to, respectively, an across-group sensor space representation and an across-group source

Single Subject Pipeline



Raw data MEG

MaxFiltering and low-pass filtering

Find events, adjust timeline and downsample (1)

Clean and epoch the data (2)

Remove eye- and heart-related components (3)

Average the epochs to obtain timelocked Responses (4)

Remove the average from each trial (*untimelocked Analysis*) (5)

Time-frequency analysis (6)

Combine Gradiometers (7)

Demean time-frequency Representations (8)

Raw data MRI (9)

Realign to head Fiducials (10)

Realign to head shape digitization Points (11)

Segment MRI (12)

Make brain Mesh (13)

Volume Conductor (Head Model) (14)

Subject grid warped onto a template Brain (15)

Leadfield based on warped template (16)

Crop data to oscillatory component of Interest (17)

Fourier transform frequency of Interest (18)

Beamformer Contrast (19)

Andersen, L.M., 2018. Front. Neurosci. 12.

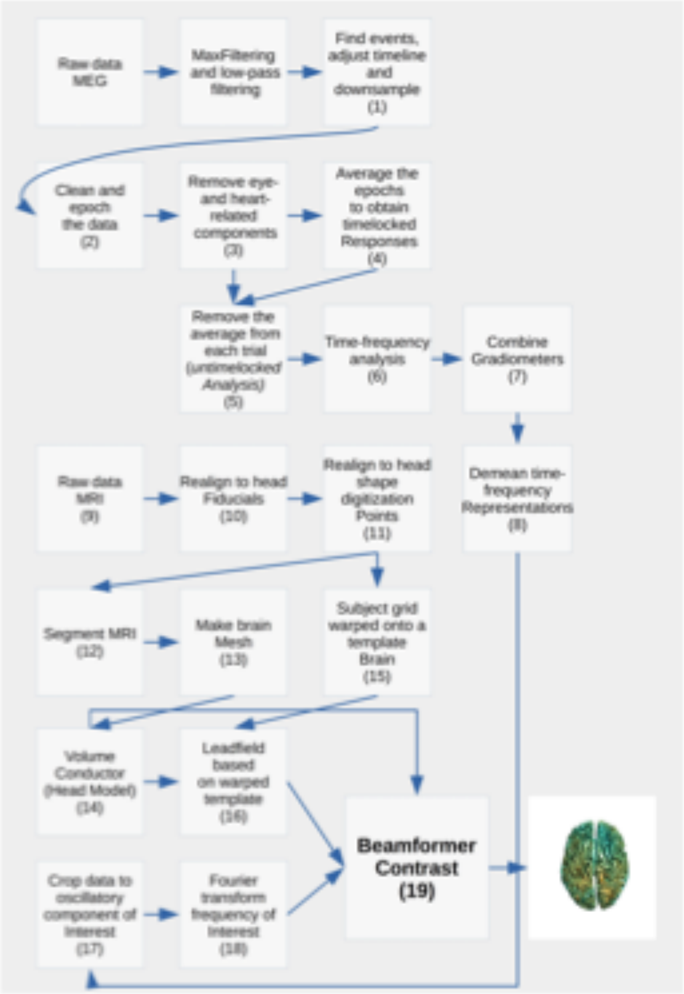
Single Subject Pipeline

Three sections

1) *Preprocess MEG data*

2) Preprocess MR data

3) Do source analysis (beamformer)



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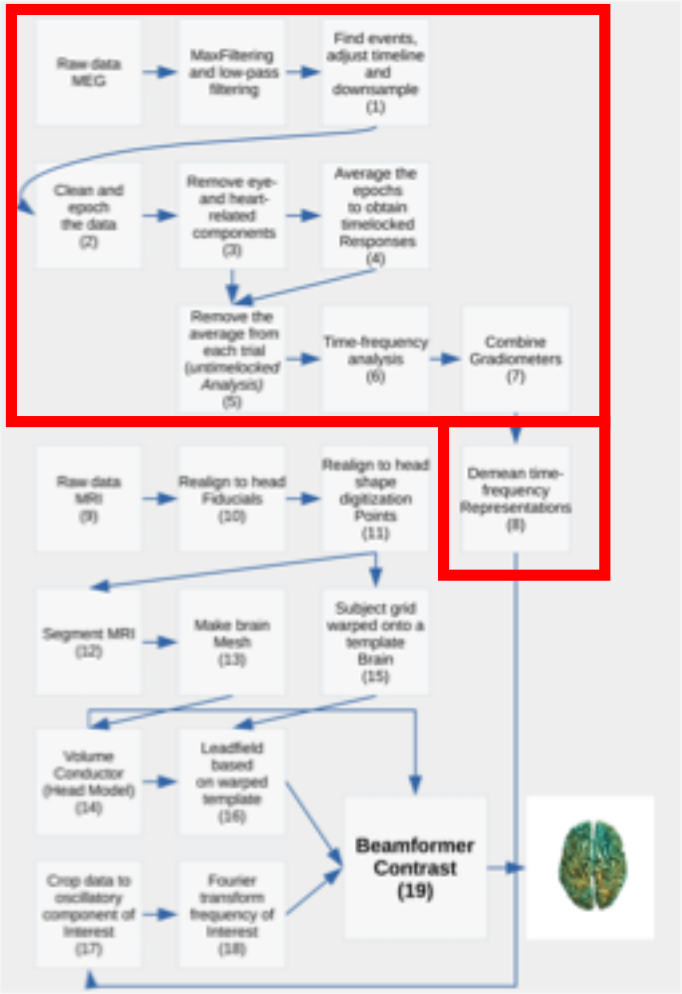

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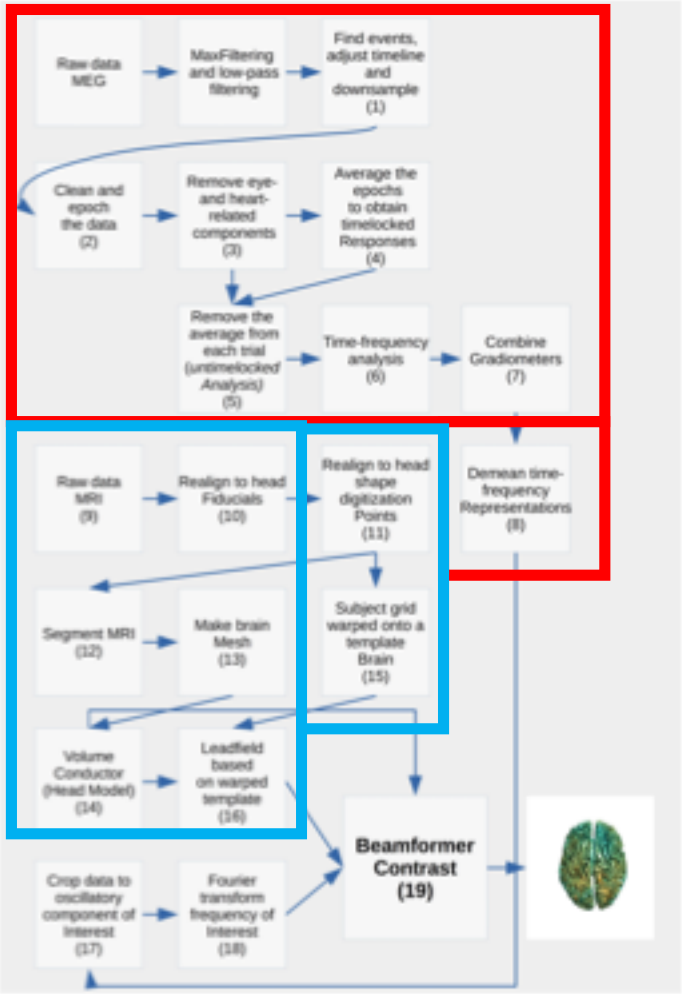

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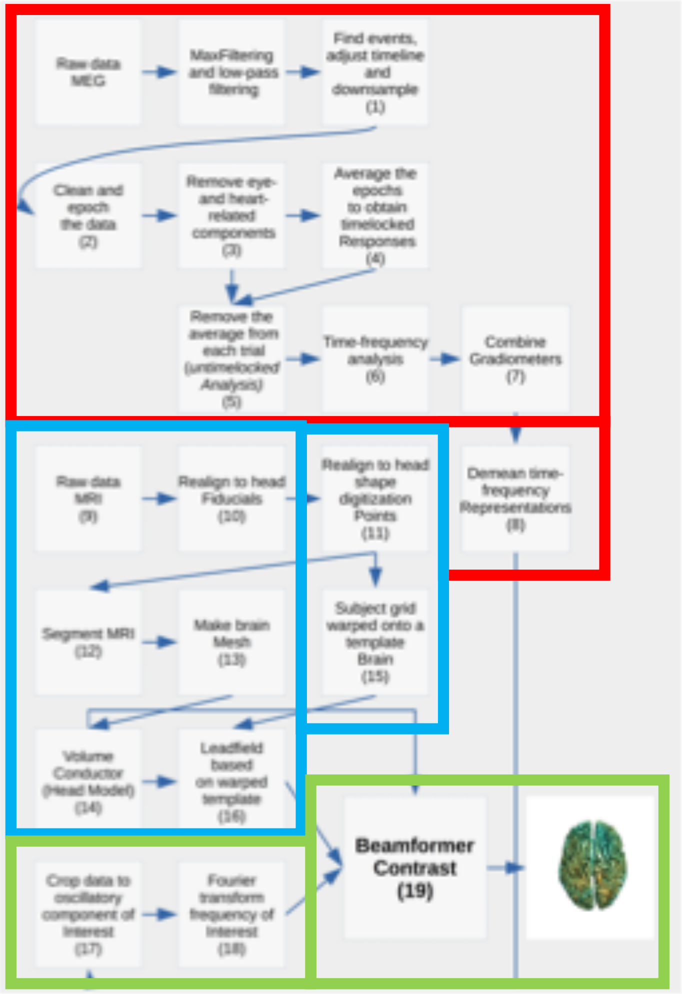
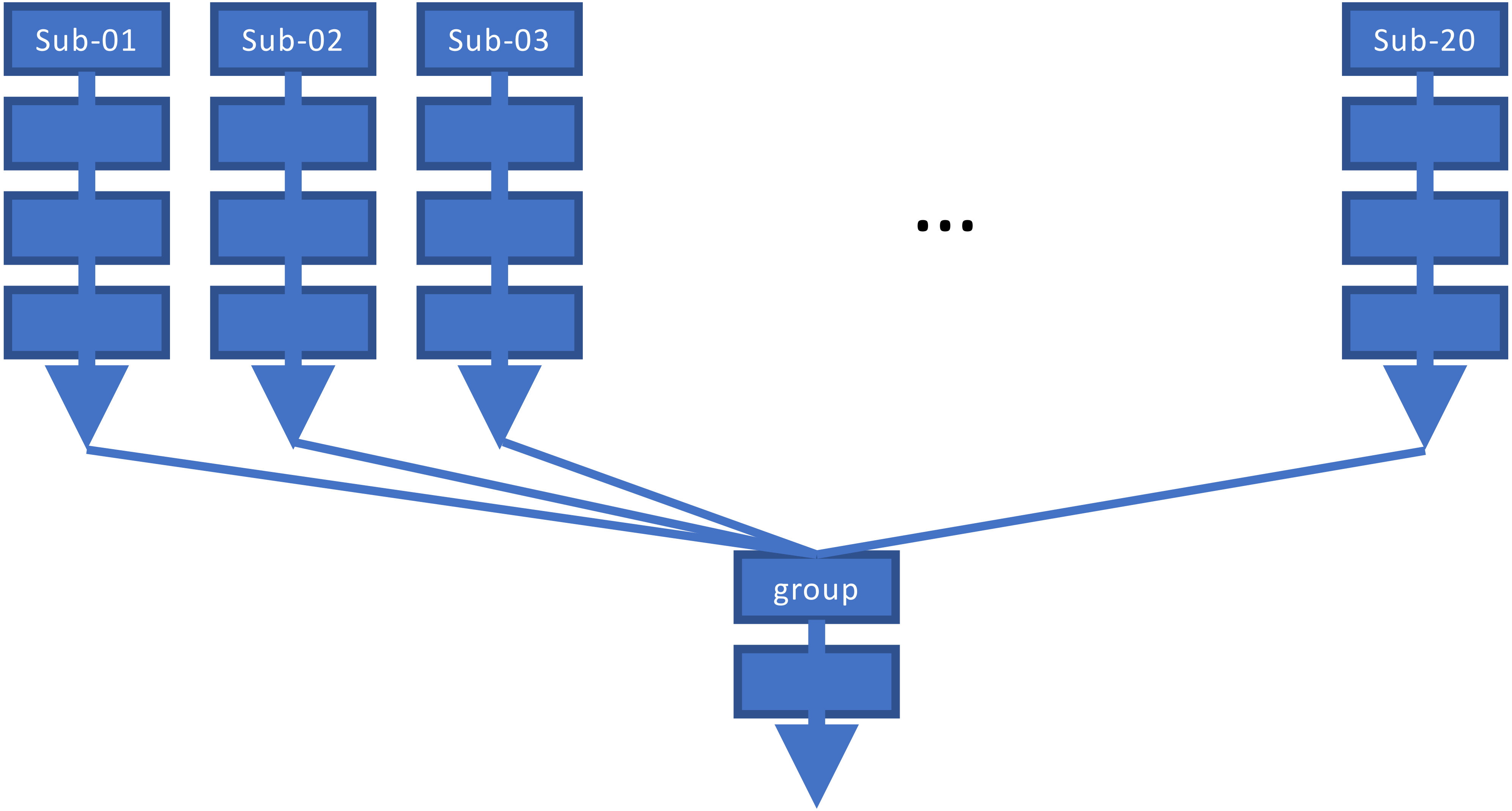
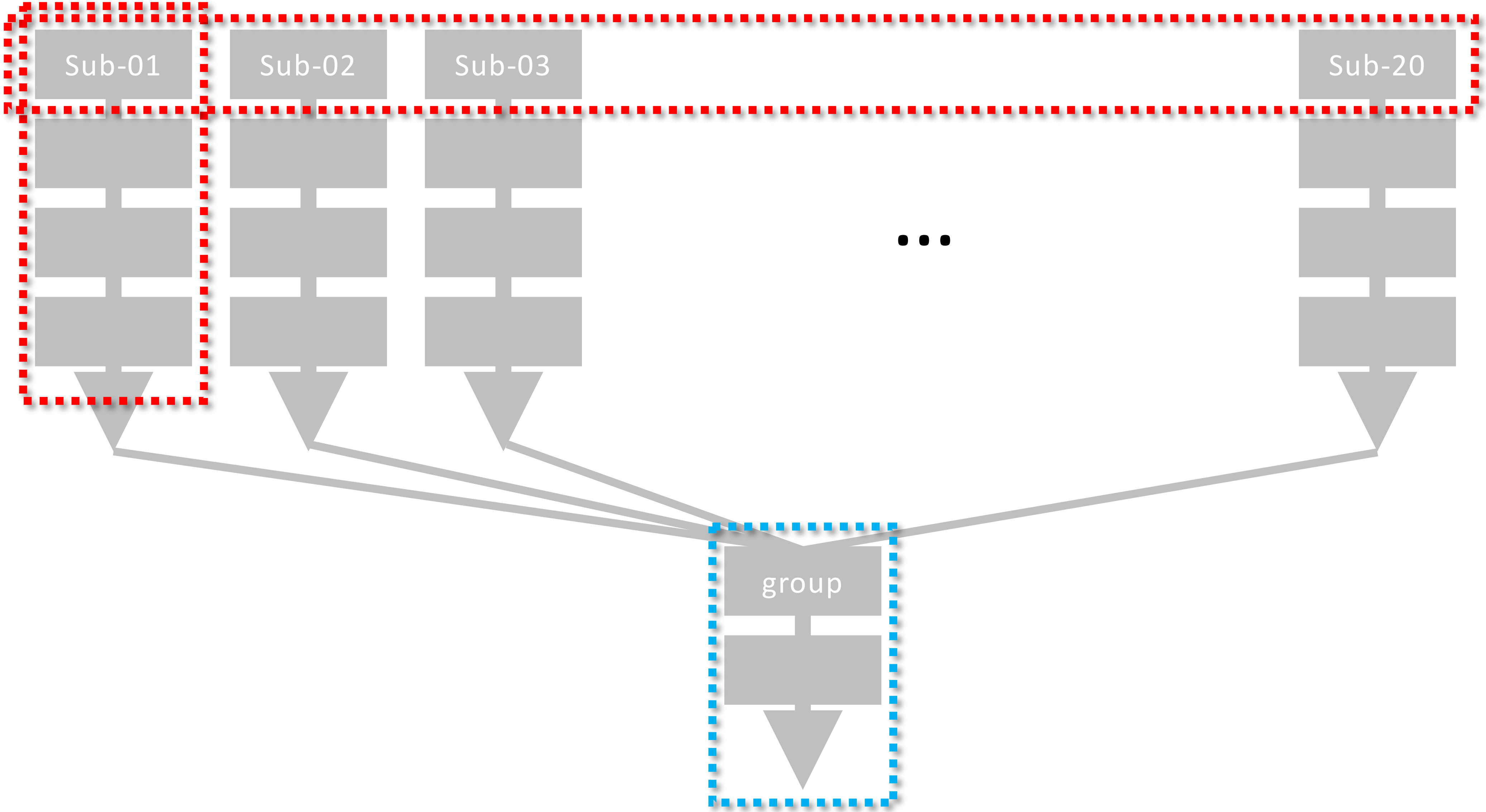


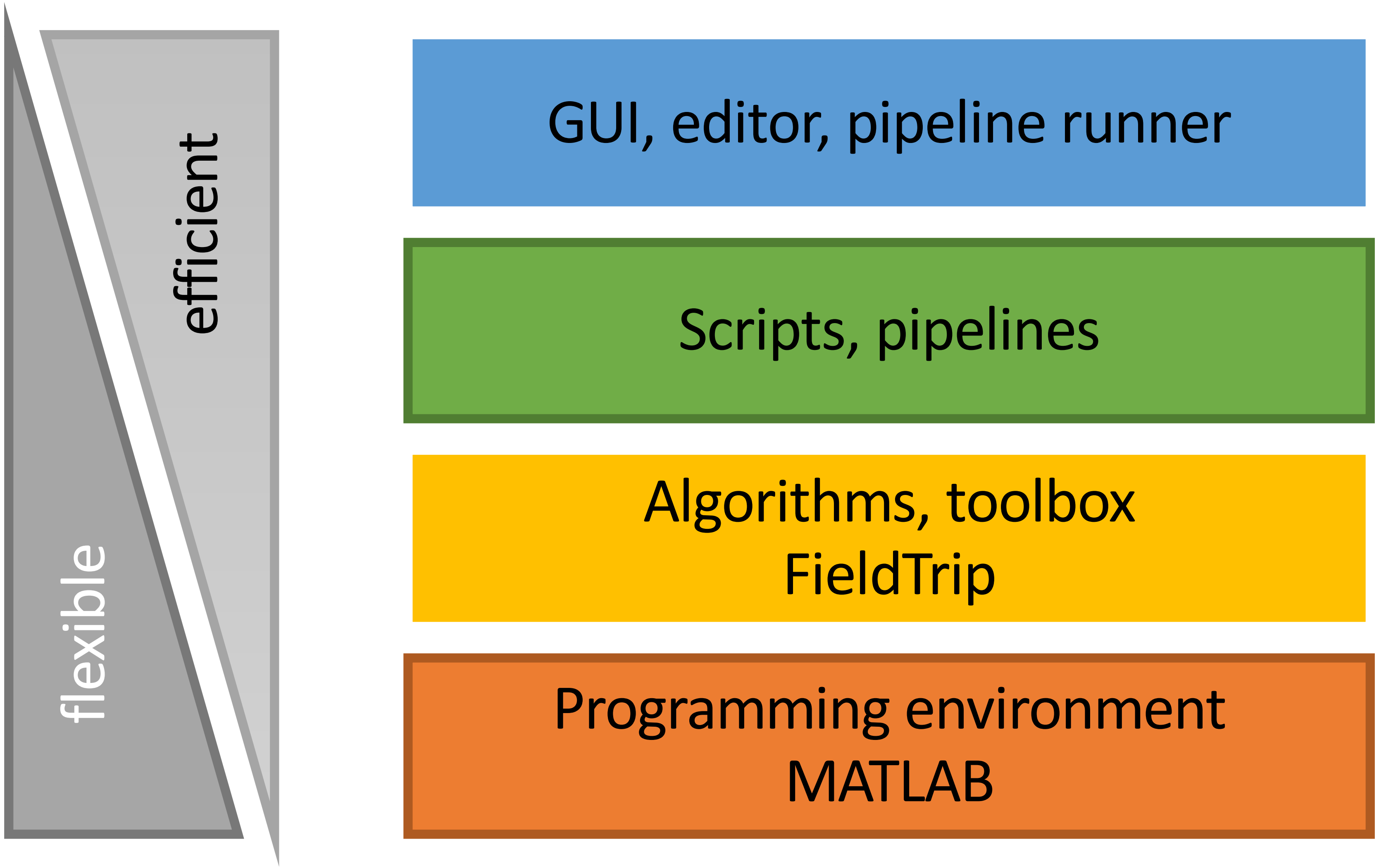
Designing large scale analyses



Running large scale analyses



Low-level versus high-level analyses



GUI, editor, pipeline runner

Scripts, pipelines

Algorithms, toolbox
FieldTrip

Programming environment
MATLAB